September 9, 2011

Stephen F. Nightingale
Manager, Permit Section
Bureau of Land
Illinois Environmental Protection Agency
1021 North Grand Ave. East
Springfield, IL 62794-9276

Re: 2018080001 – Winnebago County
      Winnebago Landfill
      Permit No. 1991-138-LF
      Addendum 1 to Log No. 2010-490

Dear Mr. Nightingale:

On behalf of Winnebago Landfill, submitted herein are an original and three copies of an addendum to Illinois EPA Log No. 2010-490. The original application provided an alternate source demonstration for confirmed second quarter 2010 exceedences. The application forms were provided in the original application, which was submitted to the Illinois EPA on October 12, 2010.

Concentrations of dissolved chromium and total dissolved solids at northern unit upgradient well G13D were evaluated as part of the original alternate source demonstration. Since a complete reevaluation of the background groundwater quality for the northern unit had already been proposed as part of pending application Log No. 2010-038 (GMZ investigation report), no further action was proposed for dissolved chromium or total dissolved solids as part of the alternate source demonstration.
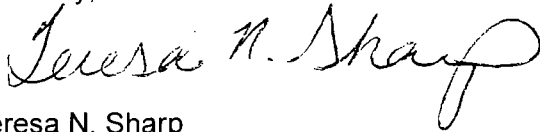
However, Addendum 3 to Log No. 2010-038 was submitted on September 2, 2011, specifically to withdraw the proposal to reevaluate the background groundwater quality for the northern unit. Therefore, to account for the change in background groundwater quality data for dissolved chromium and total dissolved solids observed at G13D, a revised interwelll value is proposed and included in Attachment A. Eight consecutive quarters of data (third quarter 2009 through second quarter 2011) from the northern unit upgradient wells (G09M, G09D, G13S, G13D, and G20D) were used to derive the revised interwell value. The statistical method used is provided in Attachment B.

The exceedence of the southern unit interwell value (1,310.4 mg/l) for total dissolved solids at upgradient well R22S was also addressed in the original application. A well-specific intrawell value was proposed for total dissolved solids at R22S. As outlined in the alternate source demonstration, R22S is an upgradient well and is not expected to be impacted by the facility. The concentrations of dissolved chromium at R22S represent natural fluctuation in the background groundwater quality. In discussions with the Illinois EPA regarding the original submittal, it was suggested that if it can be demonstrated that a change in background groundwater quality has occurred, then the site interwell value should be revised. Given the natural fluctuation of groundwater quality observed in upgradient well R22S, a revised interwell value for total dissolved solids at the southern unit is appropriate. A revised interwell value

utilizing eight consecutive quarters of data (third quarter 2009 through second quarter 2011) from the southern unit upgradient wells (R11S, G11D, G13S, G13D, R22S, and R22D) is provided in Attachment A. The statistical method used is provided in Attachment B. The initial proposal to establish a well-specific intrawell value for total dissolved solids at R22S is withdrawn.

Please contact Tom Hilbert at (815) 963-7516 if you have any questions or require additional information.

Sincerely,

Teresa N. Sharp
Environmental Scientist

TNS:bjh:sjb

Enclosure(s)

cc: Tom Hilbert – Rock River Environmental Services
     Bernie Shorle – US EPA Region 5

ATTACHMENT A

Revised Interwell Values

Winnebago Landfill
Northern Unit
Interwell AGQS Statistics

Parameter	Units	G09M								G09D							
		3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Chromium, dissolved	ug/l	22	12	8.9	11	18	16	17	20	5	5	< 4	< 4	6.2	4.4	9.1	5.6
Total dissolved solids	mg/l	1,400	1,600	970	1,600	1,500	1,700	1,500	1,600	910	1,000	1,600	1,000	1,000	1,100	980	1,000

Parameter	Units	G13S								G13D							
		3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Chromium, dissolved	ug/l	< 4.7	< 4	< 4	4	5.3	4.2	4.2	8.2	16	12	< 4	72	70	42	29	11
Total dissolved solids	mg/l	1,100	1,100	1,100	1,000	1,100	1,200	1,200	1,300	1,700	1,800	1,700	4,200	3,700	3,100	2,300	1,600

Parameter	Units	G20D								Normal Distribution*	Nonparametric Upper Prediction Limit**
		3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11		
Chromium, dissolved	ug/l	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	no	72
Total dissolved solids	mg/l	310	350	330	370	320	410	370	330	no	4,200

Notes:
*Shapiro-Wilk utilized to test for normality
**The maximum value was utilized as the nonparametric upper prediction limit

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Winnebago Landfill
Southern Unit
Interwell AGQS Statistics

RAW DATA

					G11D										R11S			
Parameter	Units	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Total dissolved solids	mg/l	400	380	380	390	430	410	410	400	380	400	380	380	390	400	390	380

					G13D										G13S			
Parameter	Units	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Total dissolved solids	mg/l	1,700	1,800	1,700	4,200	3,700	3,100	2,300	1,600	1,100	1,100	1,100	1,000	1,100	1,200	1,200	1,300

					G22D										R22S			
Parameter	Units	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Total dissolved solids	mg/l	400	760	780	1,200	1,000	1,200	670	810	1,800	1,900	1,800	2,400	2,400	2,600	1,800	2,100

OUTLIER ANALYSIS

Number of		Standard	Critical					G11D									G11D									R11S								R11S			
Samples	Mean	Deviation	Values	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
48	1231.67	925.2793	2.94	-0.899	-0.920	-0.920	-0.910	-0.866	-0.888	-0.888	-0.899	--	--	--	--	--	--	--	--	-0.920	-0.899	-0.920	-0.920	-0.910	-0.899	-0.910	-0.920	--	--	--	--	--	--	--	--

Number of		Standard	Critical					G13D									G13D									G13S								G13S			
Samples	Mean	Deviation	Values	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
48	1231.67	925.2793	2.94	0.506	0.614	0.506	3.208	2.668	2.019	1.155	0.398	--	--	--	x	--	--	--	--	-0.142	-0.142	-0.142	-0.250	-0.142	-0.034	-0.034	0.074	--	--	--	--	--	--	--	--

Number of		Standard	Critical					G22D									G22D									R22S								R22S			
Samples	Mean	Deviation	Values	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
48	1231.67	925.2793	2.94	-0.899	-0.510	-0.488	-0.034	-0.250	-0.034	-0.607	-0.456	--	--	--	--	--	--	--	--	0.614	0.722	0.614	1.263	1.263	1.479	0.614	0.938	--	--	--	--	--	--	--	--

ND ANALYSIS

Number of	Number of	%	ND
Samples	ND's	ND	Treatment
48	0	0%	NO ADJ

$$\text{Tolerance Limit} = x + st[1+(1/n)]^{1/2}$$
$$\text{Confidence Level} = 95\%$$

PREDICTION LIMIT

ND		Standard	Number of	T	Prediction
Treatment	Mean	Deviation	Samples	Value	Limit
NO ADJ	1231.67	925.2793	48	1.6779	2,800.31

ATTACHMENT B

Statistical Method

Statistical Analyses Method

References:

1. 35 Illinois Administrative Code 811.320
2. Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Unified Guidance, USEPA, March 2009

Background quality shall be determined using the statistical techniques set forth in 35 IAC 811.320(e) and the facility permit. The data, was tested for normality using the Shapiro-Wilk normality test. If the data was found not to follow a normal distribution, a nonparametric statistical method was utilized. The data was then examined for outliers. After the outlier test, the percentages of non-detect values (NDs) were calculated for each parameter to determine the applicable ND treatment method, if any. Upon completion of the treatment of non-detect values, the prediction limit for each parameter was calculated using the mean, standard deviation, and the appropriate t value. The statistical analysis uses a one-tailed test to determine an upper limit of significance. The upper prediction limit is the concentration for the probability that the constituent can be measured without constituting a statistical increase above the background. Any concentration found below this limit is regarded as falling within the normal statistical population.

Statistical Method

The statistical method employs either the 99% or 95% prediction limit in accordance with the facility permit. The prediction limit incorporates the mean, standard deviation, number of samples, and the Student's t value in the calculation to determine general background groundwater quality. An upper prediction limit is calculated for each individual chemical parameter. The well data from the site is evaluated statistically with samples collected during a minimum of four (4) consecutive quarters of background sampling.

Handling of Outliers

Prior to statistical analyses the data set was evaluated for outliers. Outliers are defined as data points that vary significantly from the mean value for that data set. Outliers may represent sampling error, contamination from surface run-off, analytical laboratory error, or anomalous site conditions. Outliers, if not removed from the data set, can erroneously

increase the AGQS and minimize the occurrence of an exceedences related to a release from a waste unit. Once a statistical outlier has been identified, the concentrations are evaluated to determine the cause. If a valid reason has been determined for the outlier, the data point will be removed from the data set. If no specific reason can be documented, the point will considered representative and included in the analysis. Statistical analysis will then be conducted as described below.

Handling of Non-Detects (NDs)

Non-detect values (NDs) were handled according to the percentage of Non-Detects (%ND) present in the background sampling. The %ND was calculated for each parameter from the pooled background data of each well set. The data treatment was done according to the following criteria:

a) For under 0% NDs, no adjustment is made to the values in the data set.

b) For under 15% NDs, the value of one-half (½) the reported Detection Limit (DL) was substituted for the ND value, and the mean and standard deviation were calculated using detected values with the substituted ND values.

c) For 15-50% NDs, Cohen's Adjustment was used to adjust the mean and standard deviation. The adjusted mean and standard deviation was then used to calculate the prediction limit.

d) For over 50% but not 100% NDs, the highest recorded concentration was substituted for the prediction limit.

e) For 100% NDs, the Practical Quantitation Limit (PQL) will be substituted for the ND value. The mean and standard deviation was calculated using the substituted ND values.

Prediction Limit

The statistical procedure was conducted according to the following steps:

1.   <u>Calculate arithmetic mean</u>

The arithmetic mean was calculated using the pooled data for each parameter. The arithmetic mean (X_b) was calculated using the following equation:

$$X_b = \frac{X_1 + X_2 + ... + X_n}{n}$$

where: X_b = Average background value

X_n = Individual background value for n sample

n = Number of background values

2. Calculate standard deviation

The standard deviation was calculated using the pooled data for each parameter. The standard deviation was calculated using the following equation:

$$S_b = \sqrt{\frac{(X_1 - X_b) + (X_2 - X_b) + ... + (X_n - X_b)}{n-1}}$$

where:

S_b = Population standard deviation
X_n = Individual background value for n sample
X_b = Mean (1)
n = Number of background samples

3. Calculate the Upper Prediction Limit

The Upper Prediction Limit was calculated for each parameter using the mean (1), the standard deviation (2), the number of background samples, and the Student's t value. The Student's t value σ, is determined by the facility permit whether it is σ = 0.01 (99% Confidence) or σ = 0.05 (95% Confidence). The Student's t value also varies upon the number of background samples utilized in the calculations. For those parameters with 15% to 50%% NDs, the Cohen Method was utilized to calculate the Prediction Limit. The methodology described in "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Unified Guidance" was used to calculate the Cohen Prediction Limit. The Upper Prediction Limit for the remaining parameters was calculated using the following equation:

$$PL = X_b +\!\!\!\!\!{}_{-} \, S_b \bullet t \bullet \sqrt{1 + \frac{1}{n}}$$

where:

PL = Upper Prediction Limit (Upper and Lower for pH)
X_b = Mean (1)
S_b = Standard Deviation (2)
t = Student's t value at 0.01 or 0.05 significance
n = Number of background samples

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